UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/619,477	07/19/2000	Shunpei Yamazaki	0756-2178	1881

31780 7590 05/24/2005

ERIC ROBINSON
PMB 955
21010 SOUTHBANK ST.
POTOMAC FALLS, VA 20165

EXAMINER	
KIELIN, ERIK J	

ART UNIT	PAPER NUMBER
2813	

DATE MAILED: 05/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/619,477	YAMAZAKI, SHUNPEI	
	Examiner	Art Unit	
	Erik Kielin	2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 March 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *31,32,35-43,46-53 and 55-58* is/are pending in the application.

4a) Of the above claim(s) *none* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *31,32,35-43,46-53 and 55-58* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *5/2/2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 18 March 2005 has been entered.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims **31**, 32, 35-42, 55, 57 and **43**, 46-53, 56, 58 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Each of independent claims 31 and 43 recites the limitation "said wiring" in line 13. There is insufficient antecedent basis for this limitation in the claim. Because claim 31 recites, "a wiring," "a source wiring," and "a connecting wiring," it is unclear as to which wiring is being referred by the limitation, "said wiring."

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims **31,** 35, 39, 42, 55, and 57 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,668,379 (**Ono** et al.) in view of US 5,608,559 (**Inada** et al.).

Regarding **claims 31,** 35, 39, 42, 55, 57, **Ono** discloses an LCD semiconductor device (Fig. 1) --as further limited by instant **claim 42**-- comprising:

a first substrate **SUB1** (Figs. 1-3);

a thin film transistor (e.g. "**TFT**" in Figs. 2 and 3) over said first substrate **SUB1**, said thin film transistor comprising a semiconductor film **AS**, **d0** and having a source region, a drain region, and a channel formation region;

a source wiring comprising a metal film **d1** of e.g. Cr, Ti, Ta, W, or Mo, and overlying transparent conductive film **d2**, e.g. indium tin oxide ITO electrically connected with said source region (col. 9, lines 31-43);

a second substrate (the chip having the driving circuits thereon; col. 12, lines 58-62) implicitly opposing to said first substrate **SUB1** because the terminal contact opening shown in Figs. 6 and 7 faces upward;

a wiring connected with said second substrate, wherein the second substrate;

a connecting wiring (as shown in Figs. 6 and 7) for electrically connecting said thin film transistor to the driving circuits for the LCD (col. 12, line 58 to col. 13, line 4), said connecting wiring comprising:

a metallic film **d1** of Cr, Ti, Ta, W, or Mo --as further limited by instant **claim 37** -- over said first substrate **SUB1**, said metallic film having a taper shape (as shown in Fig.

17) in order to prevent breakage of the wiring **d1** (col. 9, lines 52-65; paragraph bridging cols. 14-15) and comprising a same material as that of said source wiring because it is the same film **d1** as the source electrode **d1**, said metallic film having a thickness of 60 to 150 nm (600 to 1500 Å) which overlaps 100 nm to 1000 nm --as further limited by instant **claim 35** (col. 9, lines 30-43); and

a transparent conductive film **d2** over said metallic film, which is the same materials, i.e. **d1/d2** as the source drain wiring --as further limited by instant **claim 55**-- said transparent conductive film having a thickness of 30 to 300 nm (col. 10, lines 30-36), which overlaps 50 to 500 nm --as further limited by instant **claim 39**;

and

an insulating film GI, PSV1, being in contact with a side edge of said metallic film d1, and wherein said insulating film is formed along a longer side and a shorter side of said metallic film (as shown in Figs. 6 and 7) --as further limited by instant **claim 57**.

Regarding claim 32, a semiconductor device according to claim 31 wherein the insulating film **GI**, **PSV1** comprises a same material as that contained in an insulating film between a gate wiring **g1** and a source wiring **d1**, **d2** of the thin film transistor **TFT**, specifically for example silicon nitride (col. 9, lines 10-13 and col. 12, lines 14-16).

Ono does not indicate how the driving circuits are electrically connected to the terminals shown in e.g. Figs. 6 and 7.

Inada --like **Ono**-- teaches an LCD wherein the driving circuits **24** opposing the first substrate **21** having the TFTs thereon and using an anisotropic conductive film ACF **41** for electrically connecting the wiring **28b** (called a "bump electrode **28b**" in Inada) connected with

said second substrate and the connecting wiring **66a** connected to the TFT (Fig. 6, col. 8, lines 55-60). Note also the **Inada** uses a laminate of transparent conductive oxide, such as ITO, over metal to form the terminal, just as in **Ono**, so there exists a reasonable expectation of success in using ACF to electrically connect the devices of each substrate.

It would have been obvious for one of ordinary skill in the art, at the time of the invention to connect the driving circuit of **Ono** using the ACF of **Inada**, because **Ono** does not discuss this connection, such that one of ordinary skill would look to known methods of electrically connecting driving circuits to TFT substrates in LCDs, such as that in **Inada**.

6. Claims 36, 40 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Ono** in view of **Inada,** as applied to claim 31 above, and further in view of US 6,215,077 B1 (**Utsumi** et al.).

Ono in view of **Inada**, as explained above, teaches each of the features of the claims except for forming the transparent conductive film of zinc oxide and compounds of zinc oxide and indium oxide.

Utsumi teaches the benefits of using a laminate of a metallic film **2b**, **2c** comprising aluminum layer **2b** with overlying IZO **2a** specifically for use on transparent substrates for LCDs. (See Abstract, col. 2, l. 45 to col. 3, l. 16; and especially col. 4, ll. 49-58.)

It would have been obvious to one of ordinary skill at the time of the invention to use the metallization scheme of **Utsumi** for the reasons in **Utsumi** -- at least to form a metallization free from hillocks which has a low resistance even though it incorporates a conductive metal oxide.

Moreover, it has been held that selection of a known material based on its suitability for its intended use is *prima facie* obvious. See Sinclair & Carroll Co., Inc. v. Interchemical Corp., 325 U.S. 327, 65 USPQ 297 1945). See also In re LESHIN, 125 USPQ 416 (CCPA 1960). It would have been obvious to one of ordinary skill at the time of the invention to use zinc oxide or zinc oxide and indium oxide to form the transparent conductive film and aluminum for the metallic film, because the conductive materials would be expected to work just as well as the conductive materials, used exemplary in each of **Ono** and **Inada** for interconnect wiring, according to precedent.

7. Claim 38 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Ono** in view **Inada**, as applied to claim 31 above, and further in view of US 5,821,159 (**Ukita**).

Ono in view **Inada**, as explained above, teaches each of the features of the claims except for forming the metallic film as a laminate of tungsten W and tungsten nitride compound WN_X.

Ukita discloses that it is known in the LCD art to make a metallic film for an interconnection wiring as a laminate of a tungsten and its nitride (col. 4, lines 21-25). It has been held that selection of a known material based on its suitability for its intended use is *prima facie* obvious. See Sinclair & Carroll Co., Inc. v. Interchemical Corp., 325 U.S. 327, 65 USPQ 297 1945). See also In re LESHIN, 125 USPQ 416 (CCPA 1960).

It would have been obvious to one of ordinary skill at the time of the invention to use a tungsten and its nitride to form the metallic film of **Ono** because tungsten with its nitride would be expected to work just as well as the other metallic films for interconnect wiring --particularly

since **Ono** suggests using tungsten W as one example of the metallic films **d1**-- according to precedent.

8. Claims **43**, 46, 48, 50, 53, 56, and 58 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Ono** in view of **Inada** and JP 8-234212 A (**Hioki**).

Ono in view of **Inada**, as explained above, teaches each of the features of the claims except for forming column-shaped spacers over the TFTs, wherein the material used to form the spacers is the same material as that used to form the protective film.

Hioki teaches the benefits of forming column-shaped spacers **24** over the TFTs **22** using a resin. It would have been obvious to one of ordinary skill at the time of the invention to form spacers over the TFTs of **Hioki** and form them from resin for the reasons indicated in **Hioki** -- especially because forming the spacers over the TFTs provides uniform light over the pixels.

9. Claims 47, 51 and 52 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Ono** in view of **Inada** and **Hioki**, as applied to claim 43 above, and further in view of US 6,215,077 B1 (**Utsumi** et al.).

Ono in view of **Inada** and **Hioki**, as explained above, teaches each of the features of the claims except for forming the transparent conductive film of zinc oxide and compounds of zinc oxide and indium oxide.

Utsumi teaches the benefits of using a laminate of a metallic film **2b**, **2c** comprising aluminum layer **2b** with overlying IZO **2a** specifically for use on transparent substrates for LCDs. (See Abstract, col. 2, l. 45 to col. 3, l. 16; and especially col. 4, ll. 49-58.)

It would have been obvious to one of ordinary skill at the time of the invention to use the metallization scheme of **Utsumi** for the reasons in **Utsumi** -- at least to form a metallization free from hillocks which has a low resistance even though it incorporates a conductive metal oxide.

Moreover, it has been held that selection of a known material based on its suitability for its intended use is *prima facie* obvious. See Sinclair & Carroll Co., Inc. v. Interchemical Corp., 325 U.S. 327, 65 USPQ 297 1945). See also In re LESHIN, 125 USPQ 416 (CCPA 1960). It would have been obvious to one of ordinary skill at the time of the invention to use zinc oxide or zinc oxide and indium oxide to form the transparent conductive film and aluminum for the metallic film, because the conductive materials would be expected to work just as well as the conductive materials, used exemplary in each of **Ono** and **Inada** for interconnect wiring, according to precedent.

10. Claim 49 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Ono** in view **Inada** and **Hioki**, as applied to claim 43 above, and further in view of US 5,821,159 (**Ukita**).

Ono in view **Inada**, as explained above, teaches each of the features of the claims except for forming the metallic film as a laminate of tungsten W and tungsten nitride compound WN_X.

Ukita discloses that it is known in the LCD art to make a metallic film for an interconnection wiring as a laminate of a tungsten and its nitride (col. 4, lines 21-25). It has been held that selection of a known material based on its suitability for its intended use is *prima facie* obvious. See Sinclair & Carroll Co., Inc. v. Interchemical Corp. , 325 U.S. 327, 65 USPQ 297 1945). See also In re LESHIN, 125 USPQ 416 (CCPA 1960).

It would have been obvious to one of ordinary skill at the time of the invention to use a tungsten and its nitride to form the metallic film of **Ono** because tungsten with its nitride would be expected to work just as well as the other metallic films for interconnect wiring --particularly since **Ono** suggests using tungsten W as one example of the metallic films **d1**-- according to precedent.

Response to Arguments

11. Applicant's arguments with respect to all pending claims have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Erik Kielin whose telephone number is 571-272-1693. The examiner can normally be reached from 9:00 - 19:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr. can be reached on 571-272-1702. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Erik Kielin
Primary Examiner
May 21, 2005